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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/830,894	04/27/2001	Lu-Kwang Ju	5277	5277

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AKRON, OH 44308

EXAMINER
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MARX, IRENE

ART UNIT	PAPER NUMBER
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1651

DATE MAILED: 10/18/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.

09/830,894

Applicant(s)

JU, LU-KWANG

Examiner

Irene Marx

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on 11 July 2006 and 14 July 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-4,6-34 and 106-108 is/are pending in the application.
- 4a) Of the above claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-4,6-34 and 106-108 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claim(s) \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on \_\_\_\_\_ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).  
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

## Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some \* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\* See the attached detailed Office action for a list of the certified copies not received.

## Attachment(s)

- |  |   |
|--|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892)                                | 4) <input type="checkbox"/> Interview Summary (PTO-413)<br>Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948)                       | 5) <input type="checkbox"/> Notice of Informal Patent Application                       |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)<br>Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____  |

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### DETAILED ACTION

The amendment and Appeal Brief filed 7/11/06 and 7/14/06 are acknowledged. Claims 1-4, 6-34 and 106-108 are being considered on the merits.

Upon reconsideration, the finality of the last Office action is withdrawn in view of the new ground of rejection *supra*.

#### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless --

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

#### *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(f) or (g) prior art under 35 U.S.C. 103(a).

Claims 1-4, 6-10, 17-19, 21, 28, 31-34, and 106-107 are rejected under 35 U.S.C. 102(b) as being anticipated by Hassett, D (J. Bact., 1996, Vol. 178, pages 7322-7325)

The claims are directed to a process of making the biological products biosurfactants, biopolymers or enzymes with a microorganism including bacteria, yeasts, molds and archaea in a medium containing an alternative oxidant source and under anaerobic conditions such that at least a portion of the population consumes said alternative oxidant at least a portion of the production process.

Hassett teaches a process of making the biological product alginate which is a biopolymer and at least transcription of the genes for the enzyme GDP mannose 6-dehydrogenase with the microorganism *Pseudomonas aeruginosa*, which is a bacterium, in a

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medium containing an alternative oxidant source and under anaerobic conditions such that at least a portion of the population consumes said alternative oxidant at least a portion of the production process. See, e.g., Figure 2 and Figure 3. It is noted that alginate has biosurfactant properties to the extent that is a heteropolysaccharide emulsifier. See also claim 107.

Claims 1-4, 6-11, 13, 16-22, 28-29, 31-34, and 106-108 are rejected under 35 U.S.C. 102(b) as being anticipated by Manresa *et al.* (J. of Industrial Microbiology, vol. 8, 1991, pages 133-136).

The claims are directed to a process of making the biological products biosurfactants, biopolymers or enzymes with a microorganism including bacteria, yeasts, molds and archaea in a medium containing an alternative oxidant source and under anaerobic conditions such that at least a portion of the population consumes said alternative oxidant at least a portion of the production process.

Manresa *et al.* teach a process of making the biological product rhamnolipids which is a biosurfactant and biopolymer with the microorganism *Pseudomonas aeruginosa*, which is a bacterium, in a medium containing an alternative oxidant source and under anaerobic conditions such that at least a portion of the population consumes said alternative oxidant at least a portion of the production process. See, e.g., Figures and page 135, bridging paragraph between col. 1 and col. 2.

Claims 1-4, 6, 17-19, 21, 28, and 31-34, are rejected under 35 U.S.C. 102(b) as being anticipated by Bamforth *et al.* (Arch. Microbiol., 1978, Vol. 119, pages 91-97)

The claims are directed to a process of making the biological products biosurfactants, biopolymers or enzymes with a microorganism including bacteria, yeasts, molds and archaea in a medium containing an alternative oxidant source and under anaerobic conditions such that at least a portion of the population consumes said alternative oxidant at least a portion of the production process.

Bamforth *et al.* teach a process of making the biological product methanol dehydrogenase, nitrate reductase and formaldehyde dehydrogenase which are enzymes and biopolymers with the microorganism *Paracoccus denitrificans*, which is a bacterium, in a

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medium containing an alternative oxidant source and under anaerobic conditions such that at least a portion of the population consumes said alternative oxidant at least a portion of the production process. See, e.g., pages 91-92 Materials and Methods and Purification of Methanol dehydrogenase and page 94, paragraph 2, *et seq.*

Claims 1-4, 10, 17-19, 21, 28, and 31-34, are rejected under 35 U.S.C. 102(b) as being anticipated by Shoun *et al.* (J. Bact., 1998, Vol. 180, pages 4113-4415)

The claims are directed to a process of making the biological products biosurfactants, biopolymers or enzymes with a microorganism including bacteria, yeasts, molds and archaea in a medium containing an alternative oxidant source and under anaerobic conditions such that at least a portion of the population consumes said alternative oxidant at least a portion of the production process.

Shoun *et al.* teach a process of making the biological product nitrite reductase which is an enzyme and biopolymer with the microorganism *Streptomyces thioluteus*, which is a bacterium, in a medium containing an alternative oxidant source and under anaerobic conditions such that at least a portion of the population consumes said alternative oxidant at least a portion of the production process. See, e.g., page 4413.

Claims 1-4, 6, 10, 16-21, 23, 26, 28, and 31-34 are rejected under 35 U.S.C. 102(b) as being anticipated by Laanbroek *et al.*, (Arch. Microbiol., 1978, Vol. 119, pages 99-102)

The claims are directed to a process of making the biological products biosurfactants, biopolymers or enzymes with a microorganism including bacteria, yeasts, molds and archaea in a medium containing an alternative oxidant source and under anaerobic conditions such that at least a portion of the population consumes said alternative oxidant at least a portion of the production process.

Laanbroek *et al.*, teach a process of making the biological products hydrogenases, formate-hydrogen lyase and nitrite reductase which are enzymes and biopolymers with the microorganism *Campylobacter*, which is a bacterium, in a medium containing an alternative oxidant source and under anaerobic conditions such that at least a portion of the population

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consumes said alternative oxidant at least a portion of the production process. See, e.g., page 101, col. 1, last paragraph and Discussion; Table 2.

Claims 1-4, 6-34 and 106-108 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hassett taken with Bamforth *et al.*, Shoun *et al.*, Laanbroek *et al.*, Brock, Manresa *et al.* (J. of Industrial Microbiology, vol. 8, 1991, pages 133-136) and Wagner *et al.* (U.S. Patent No. 4,814,272) for the reasons as stated in the last Office action and the further reasons below.

The claims are directed to a process of making the biological products biosurfactants, biopolymers or enzymes with a microorganism including bacteria, yeasts, molds and archaea in a medium containing an alternative oxidant source and under anaerobic conditions such that at least a portion of the population consumes said alternative oxidant at least a portion of the production process.

The teachings of Hassett, Bamforth *et al.*, and Shoun *et al.* are discussed *supra*.

The references differs from the claimed invention in that nitrate and nitrite are the only oxidant or electron acceptor disclosed for anaerobic respiration. However, Laanbroek *et al.* and Brock disclose a variety of such oxidants, including fumarate, malate, aspartate, thiosulfate, sulfur, ferric ion and nitrite (See, e.g., Laanbroek *et al.*, Abstract, and Table 2, and Brock, pages 113-114).

The substitution of nitrate or nitrite with another ion or with of salts or acids as the source of the respective ions is deemed to be well within the ordinary skill in the art, particularly since the respective ions are generally provided as a salt in an aqueous nutrient medium environment.

The references further differ from the invention as claimed in the use of fatty acids in the medium and in the specific production of a biosurfactant. However, each of Manresa *et al.* and Wagner *et al.* adequately demonstrate that it is routine in the art to provide nutrient media containing small acids, such as malonate, succinate, pyruvate or malate, or fatty acids such as stearic acid or olive oil for microorganisms, including *Pseudomonas*. (See, e.g., Manresa *et al.*, Fig 1-4, Results and Discussion, page 134 and Wagner *et al.* col. 3) for the production of a biosurfactant such as a rhamnolipid. Each of the Manresa *et al.* and Wagner *et al.* references also addresses the use of nutrient limitation in the cultivation of bacteria, specifically by limiting

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magnesium or nitrogen for the production of rhamnolipids with *Pseudomonas* (See, e.g., Examples 2-3).

In addition Manresa *et al.* recognized well before the time of the claimed invention that in the production of the biosurfactant rhamnolipid with *Pseudomonas aeruginosa* with a medium containing sodium nitrate, the bacteria may reduce nitrate by anaerobic respiration even in presence of oxygen (Page 135, bridging paragraph between col. 1 and col. 2).

Therefore, one of ordinary skill in the art would have had a reasonable expectation of success in obtaining biopolymers, biosurfactants or enzymes by cultivation of a microorganism, including bacteria or *Pseudomonas aeruginosa* in the presence of an alternative oxidant source under aerobic conditions followed by anaerobic conditions using a variety of carbon sources and the limitation of a variety of nutrients to boost yields of various biological products including at least a biosurfactant, biopolymer or enzyme depending on the specific microorganism to be cultured and/or the product to be produced.

Therefore, it would have been obvious to one having ordinary skill in the art at the time the claimed invention was made to modify the process of cultivation of microorganisms including bacteria such as *Pseudomonas aeruginosa* as taught by Hassett, Bamforth *et al.* and Shoun by the substitution of nitrate or nitrite by other oxidants, as suggested by Laanbroek *et al.* and Brock, when the oxygen demand exceeds the oxygen supply, as well as the use of nutrient limitation and various carbon substrates, as suggested by the teachings of Manresa *et al.* and Wagner *et al.* for the production of biopolymers such as rhamnolipids with *Pseudomonas aeruginosa* for expected benefit of maximizing the production with microorganisms of the useful biological products biopolymers, biosurfactants and enzymes suitable for use in the pharmaceutical industries and for foods or feed, for example.

Thus, the claimed invention as a whole was clearly prima facie obvious, especially in the absence of evidence to the contrary.

Applicants' arguments are moot in view of the new grounds of rejection.

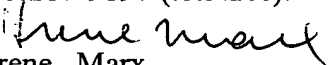
No claim is allowed.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Irene Marx whose telephone number is (571) 272-0919. The examiner can normally be reached on M-F (6:30-3:00).

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If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Michael G. Wityshyn can be reached on 571-272-0926. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300 .

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

  
Irene Marx  
Primary Examiner  
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